Presentation on the Industri-Plex-OU-2 MSGRP Comprehensive Remedial Investigation

Industri-Plex Superfund Site
Operable Unit 2
Woburn, Massachusetts

April 28, 2005

Introduction

Pursuant to requests made at EPA's April 28, 2005 public meeting on the results of the Industri-Plex Operable Unit - 2 MSGRP Remedial Investigation Report (Wells G&H OU-3 Aberjona River Study was merged into the report), please find attached slides that were used to supplement the public meeting presentation. The presentation provides a general, simple and broad perspective of the Remedial Investigation results. Details of EPA's investigation can be found in the "DRAFT Final MSGRP Remedial Investigation Report", dated March 2005.

The following presentation is provided in an Adobe Acrobat© PDF convenience copy format.

PUBLIC INFORMATION

Presentation on the Industri-Plex-OU-2 MSGRP Comprehensive Remedial Investigation

APRIL 28, 2005

Malcom White Elementary School

AGENDA

- **OPENING REMARKS**
  Joseph LeMay, USEPA Project Manager
- **MSGRP RI / FATE & TRANSPORT**
  Gordon Bullard, Tetra Tech NUS, Inc.
- **ECOLOGICAL RISK ASSESSMENT: SUMMARY AND CONCLUSIONS**
  Deborah Roberts, Metcalf & Eddy, Inc.
- **HUMAN HEALTH RISK ASSESSMENT: SUMMARY AND CONCLUSIONS**
  Diane Silverman, Metcalf & Eddy, Inc.
- **NEXT STEPS / QUESTIONS & ANSWERS**
  Joseph LeMay, USEPA Project Manager

Industri-plex OU-2 MSGRP Comprehensive Remedial Investigation:

Northern Study Area (Industri-plex)

Southern Study Area (Aberjona River Study)

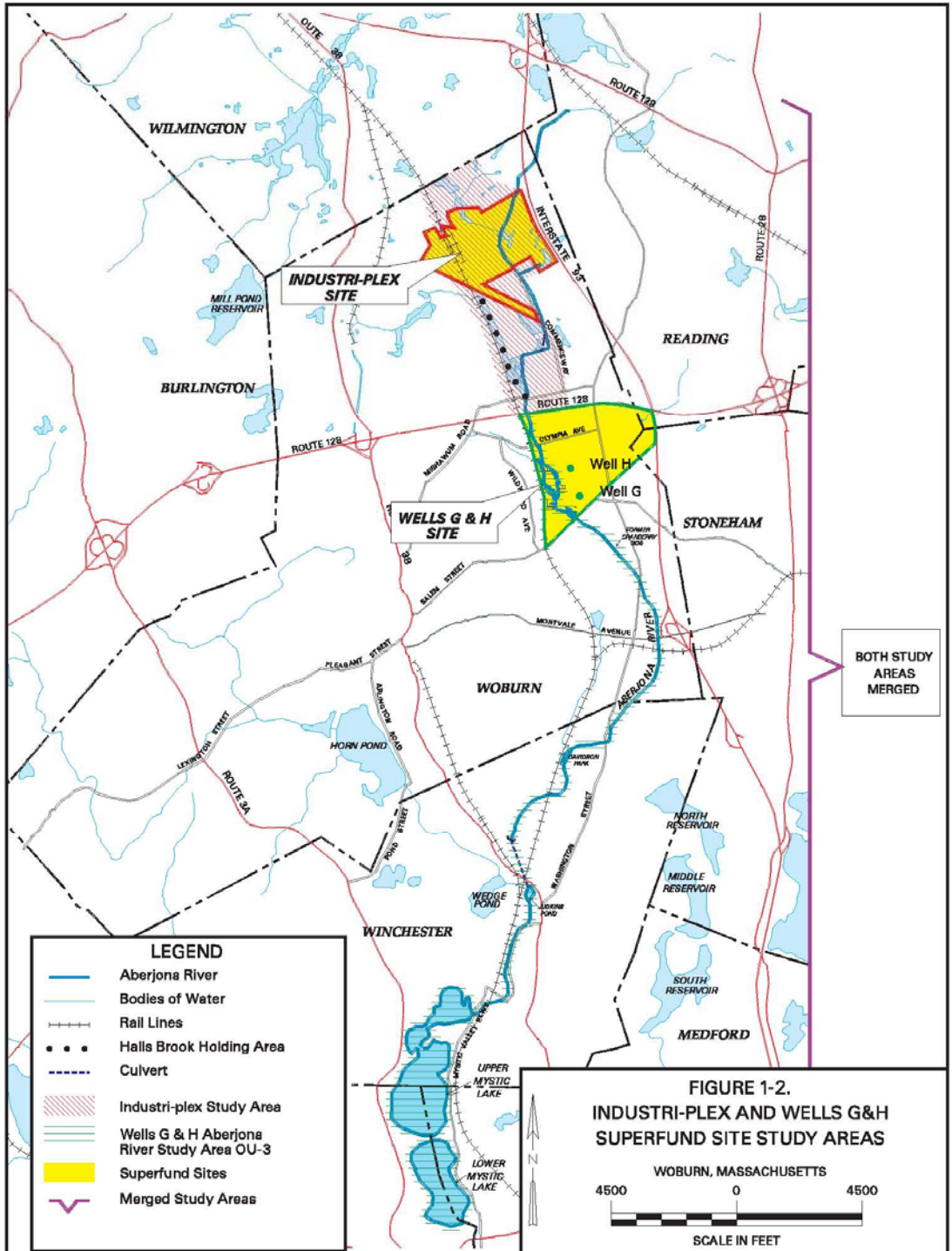

FIGURE 1-2.
INDUSTRI-PLEX AND WELLS G&H SUPERFUND SITE STUDY AREAS

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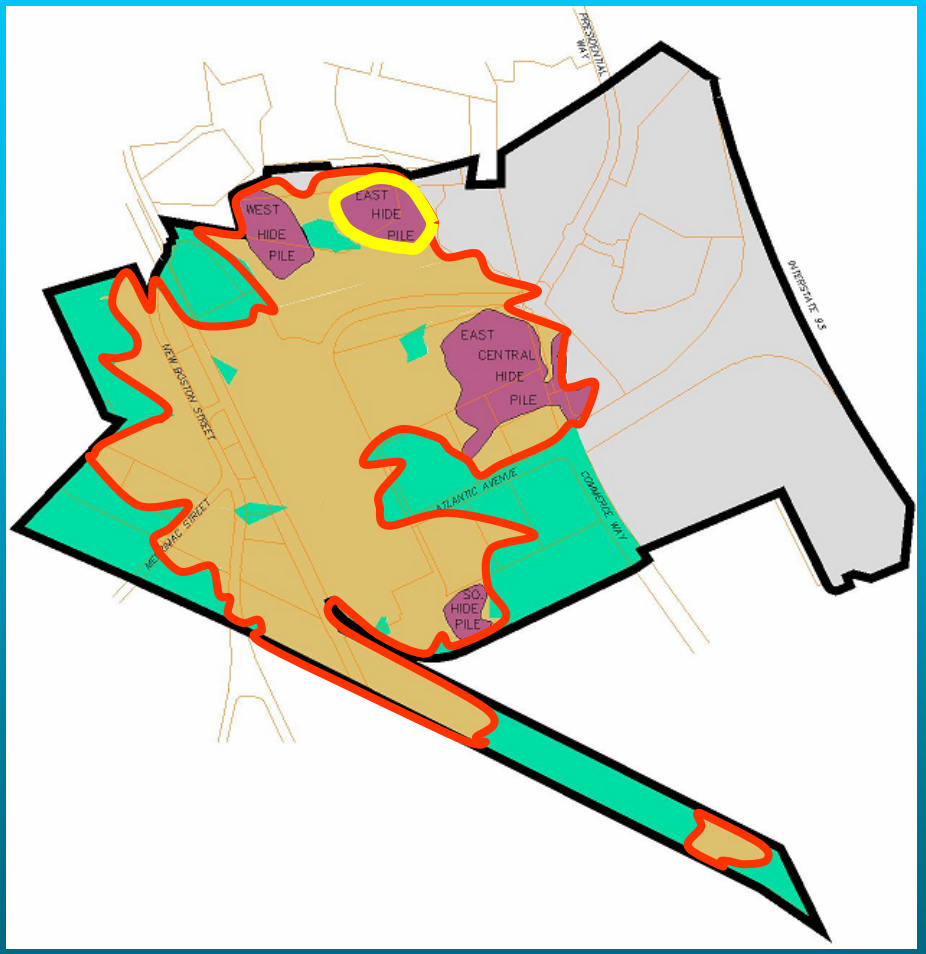
Industri-plex Site

- 245 acre Industrial Park located in north Woburn
- Chemical and glue manufacturing from 1853 to the late 1960s
- Wastes included heavy metals (arsenic, chromium, lead) and solvents (benzene, toluene)
- 1968 site development spread wastes and created "hide piles"
- Cleanup decision (ROD) signed in 1986
- Major components of the 1986 ROD included:
  - Capping of 110 acres of soils and hide piles
  - Impermeable cap and gas collection/treatment system at the East Hide Pile
  - Interim groundwater remedy for benzene and toluene hot spots
  - Perform additional groundwater and surface water investigations

Progress

- Soil Remedy was completed in 1998
- Air Remedy was completed in 1996
- GSIP was completed in 2004
- Industri-plex OU-2 MSGRP RI was completed in 2005 (Draft Final RI Report released March 2005)

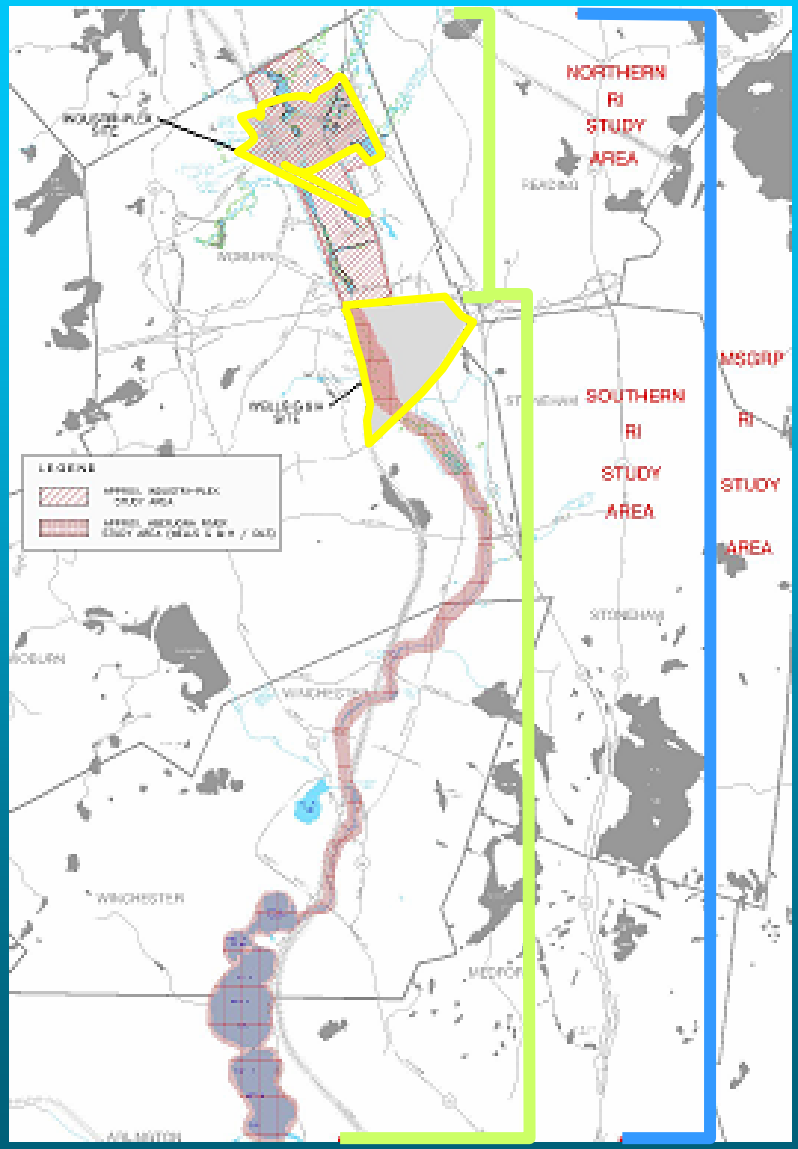


MSGRP Remedial Investigation

- In 2002, EPA merged Wells G&H Aberjona River Study (OU-3) to the Industri-plex Site comprehensive investigation for surface water and sediment.

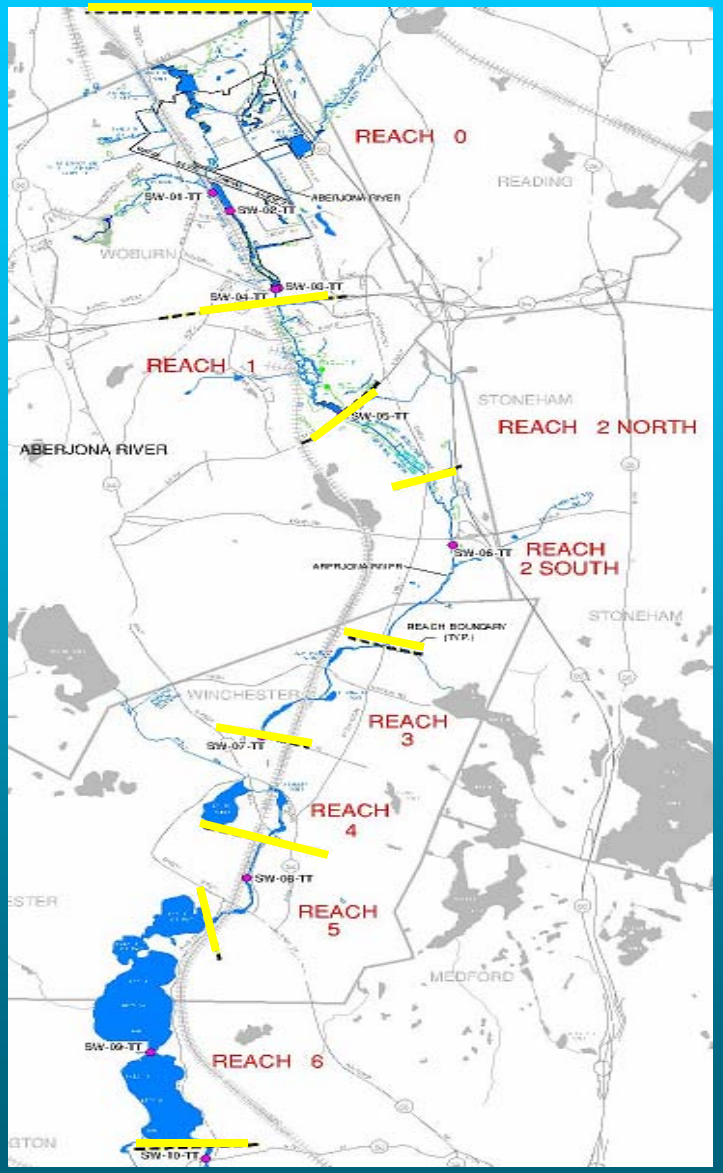
- Northern RI Study Area includes the Industri-plex Site and the Aberjona River up to I-95/Rt 128

- Southern RI Study Area includes the Aberjona River from I-95 to the Mystic Lakes, including the wetland located within the Wells G&H Site



MSGRP Remedial Investigation

- River divided into 7 Reaches
  - Habitat
  - Accessibility



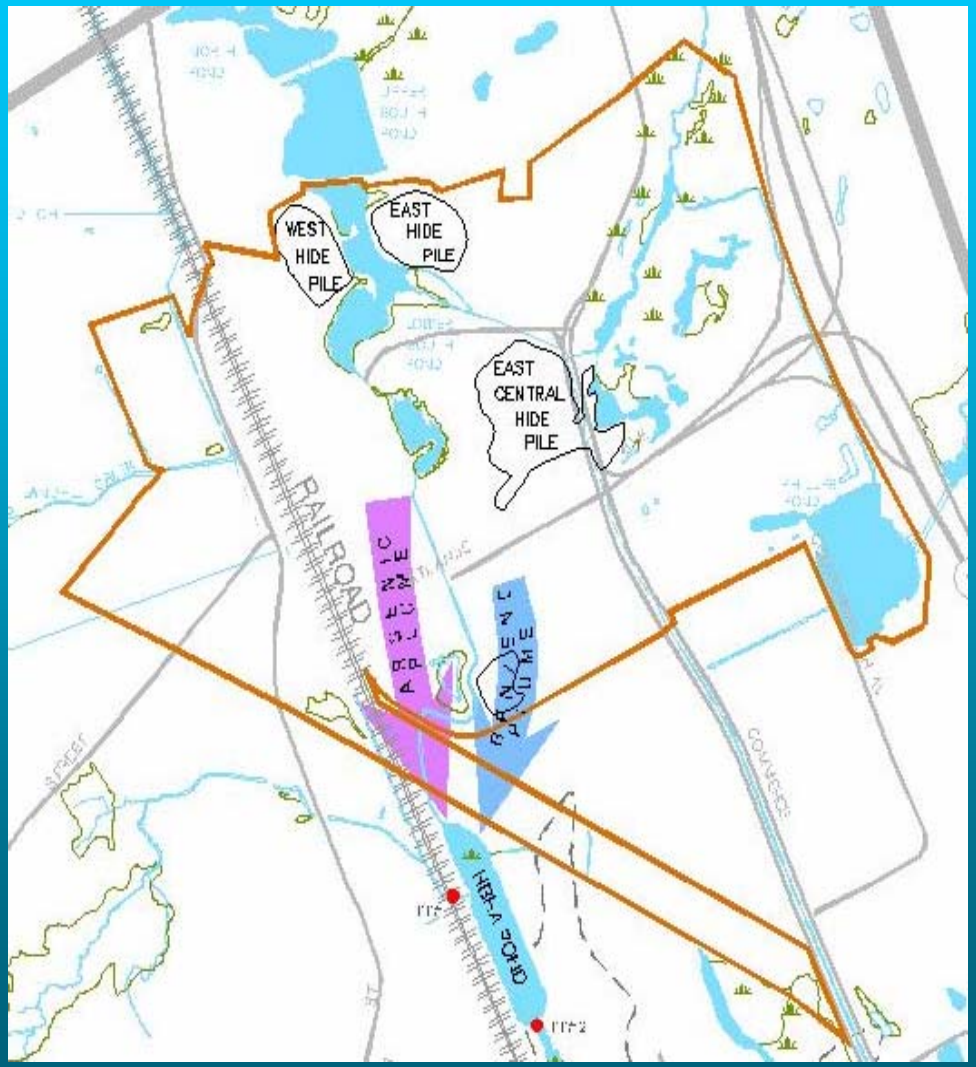
MSGRP Remedial Investigation

- Over 4,800 environmental samples were collected from soil, groundwater, sediment, surface water, and soil gas (GSIP and MSGRP)
- 18-month surface water investigation collecting monthly baseflow and storm event samples at 10 locations along the river.
- Natural Attenuation Study
- Bioavailability Study

MSGRP RI Findings

GROUNDWATER

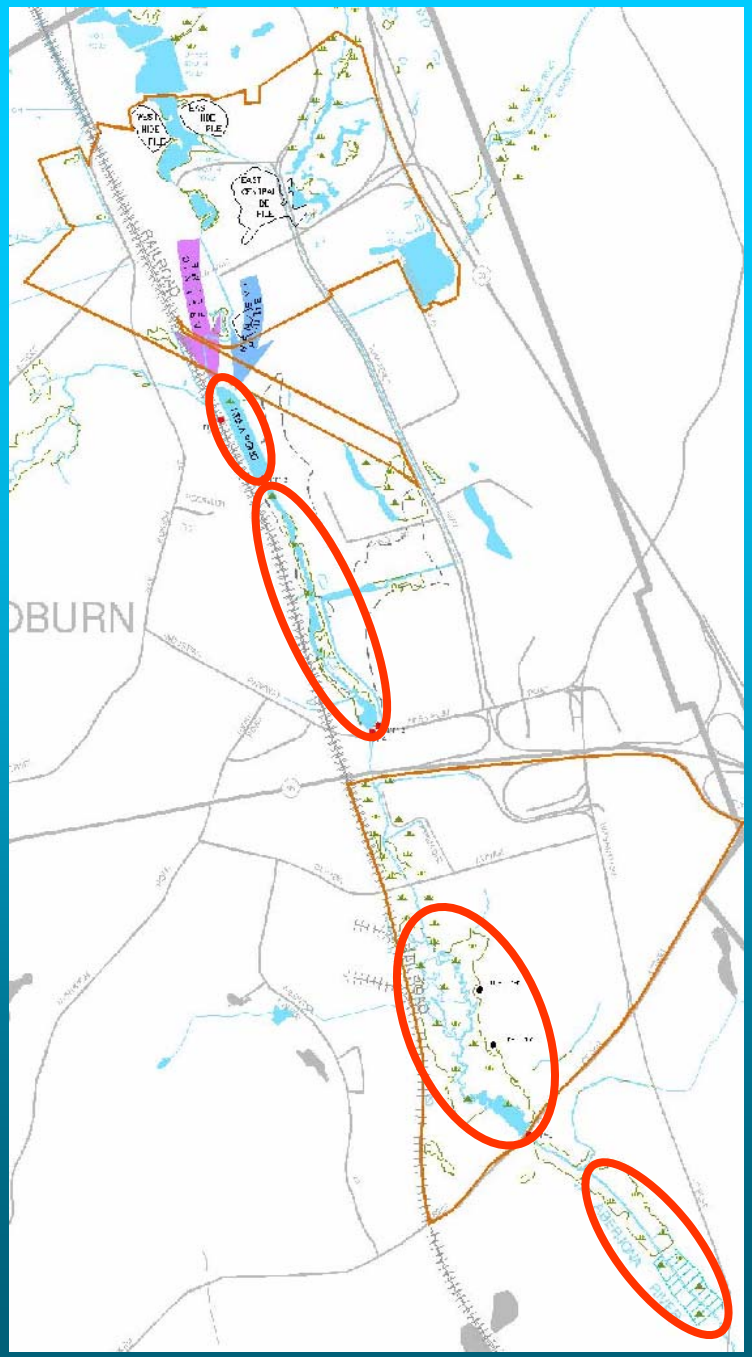
- Main COPCs: arsenic, benzene
- Lesser extent: TCE, 1,2-DCA, naphthalene



MSGRP RI Findings

SEDIMENTS

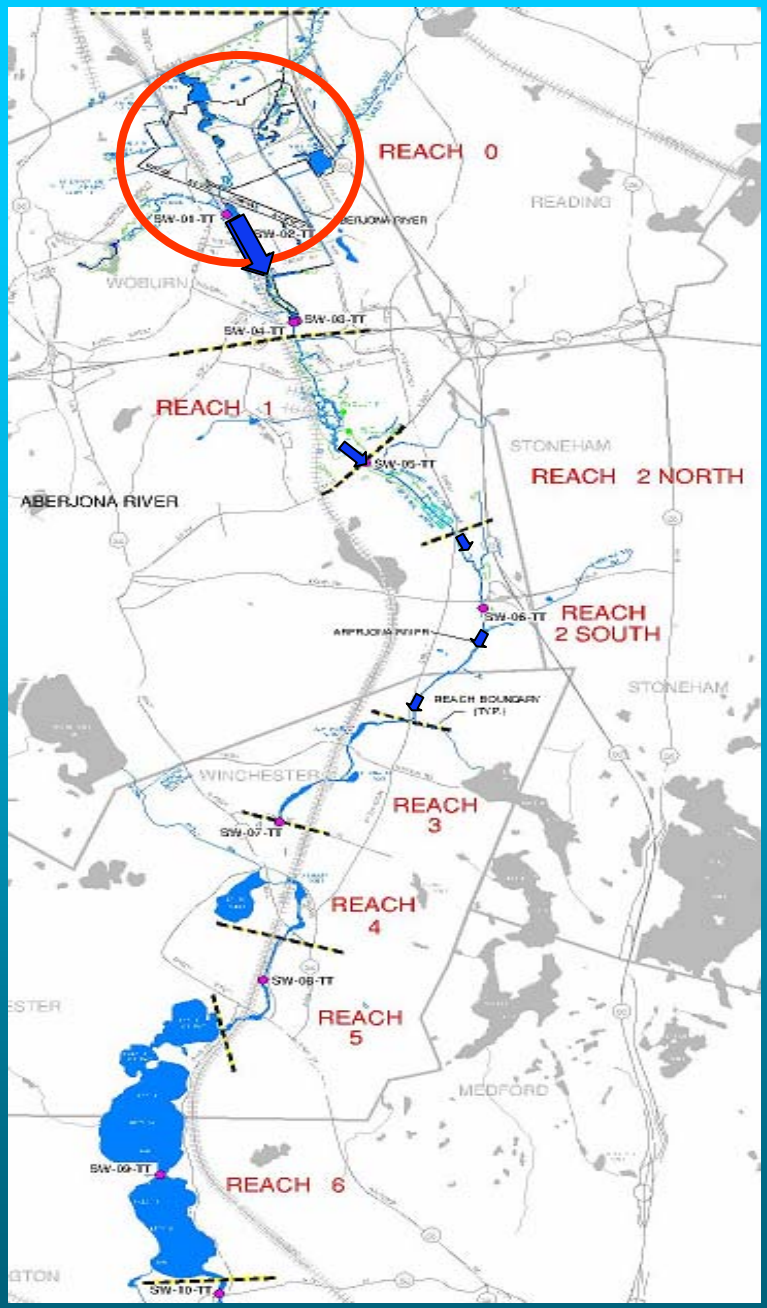
- Highest concentrations of arsenic in sediments were found in northern part of the MSGRP RI Study Area:
  - HBHA Pond
  - HBHA Wetlands
  - Wells G&H 38-acre Wetland
  - Cranberry Bog Conservation Area



MSGRP RI Findings

SURFACE WATER

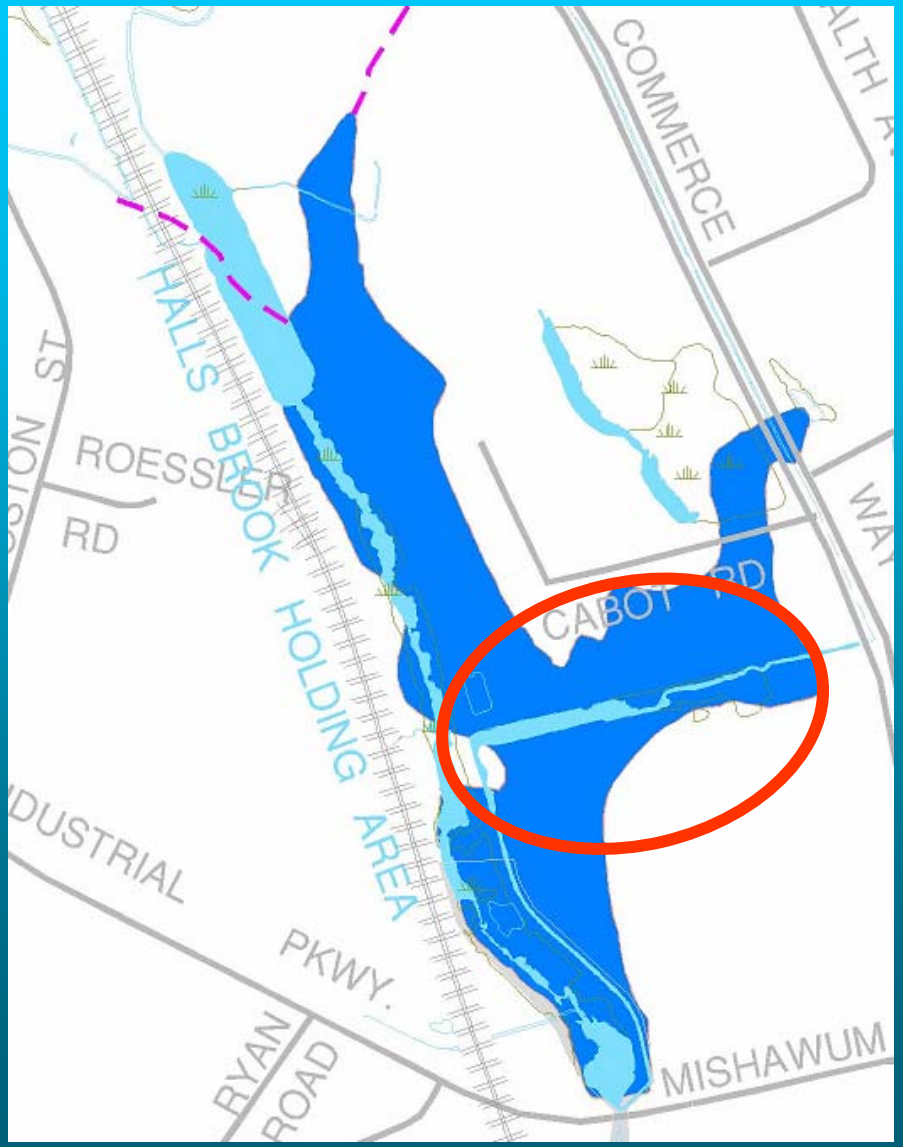
- Arsenic concentrations in surface water were greatest in the HBHA and steadily decreased at downstream stations throughout the Aberjona River
- Main source of arsenic contamination to the Aberjona River is groundwater originating from the Industri-plex Site



MSGRP RI Findings

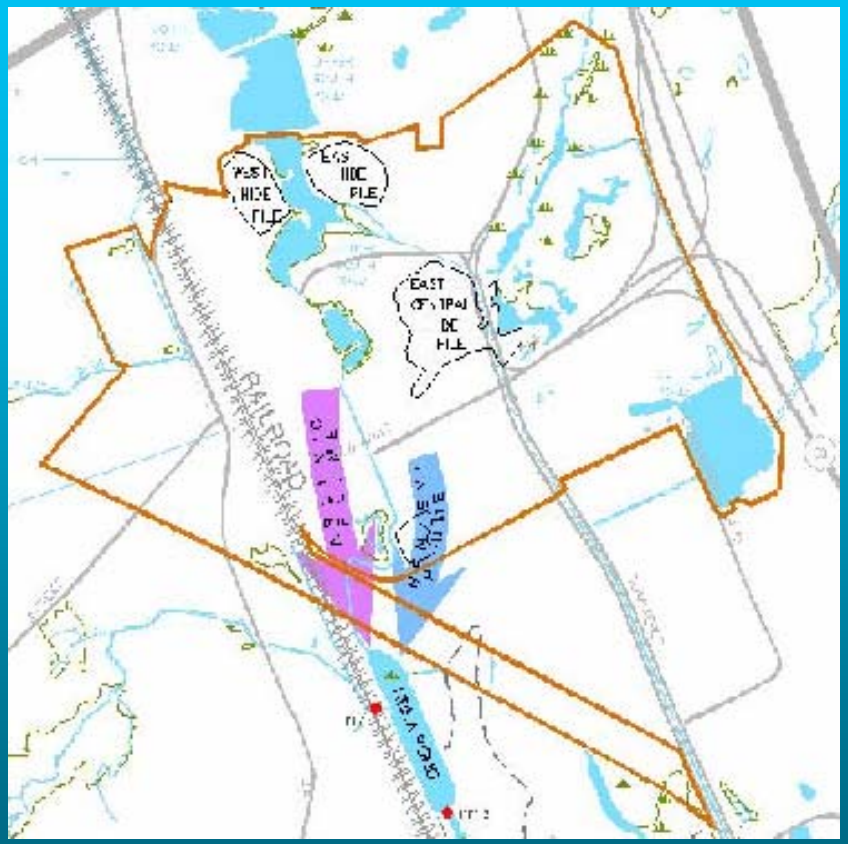
SOIL

- Soil contaminated with arsenic in the area of the former Mishawum Lake Bed



Fate and Transport of Key Contaminants

- Geochemical conditions in groundwater dissolve arsenic that exists in the soil matrix
- Dissolved arsenic and benzene flow with groundwater and discharge to the HBHA Pond

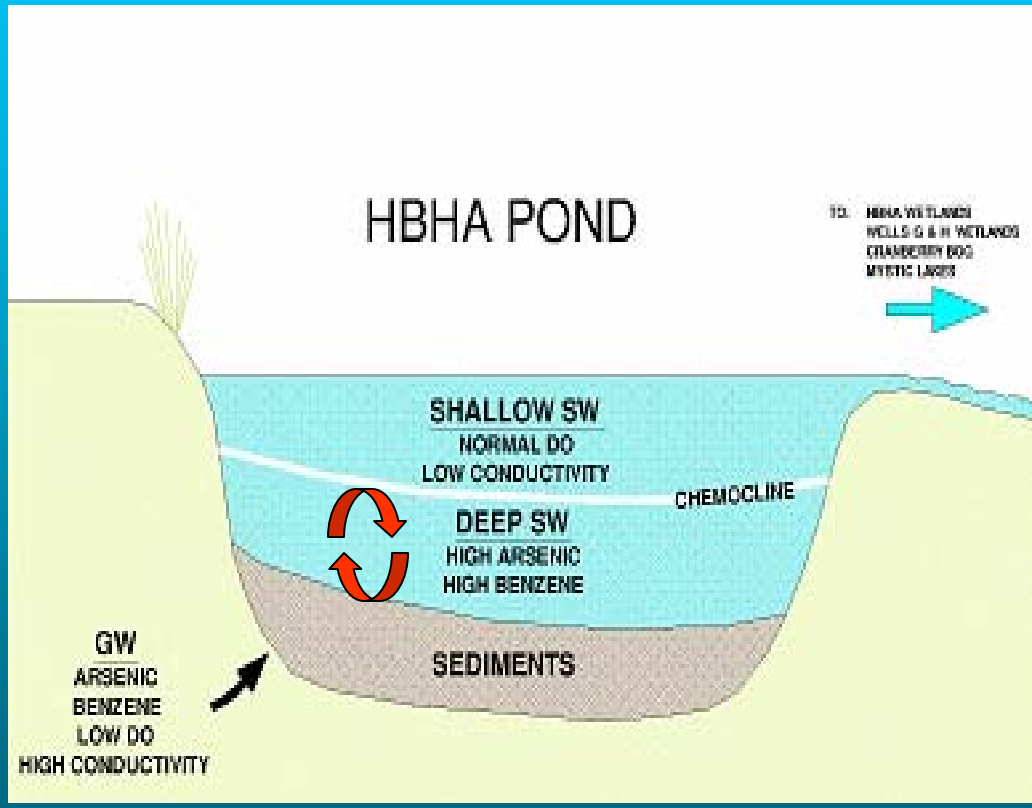


Fate and Transport of Key Contaminants

- A "chemocline" exists in HBHA Pond.

HALLS BROOK SURFACE WATER
(normal DO, low conductivity)

GROUNDWATER
(Arsenic, Benzene, Low DO, High conductivity)



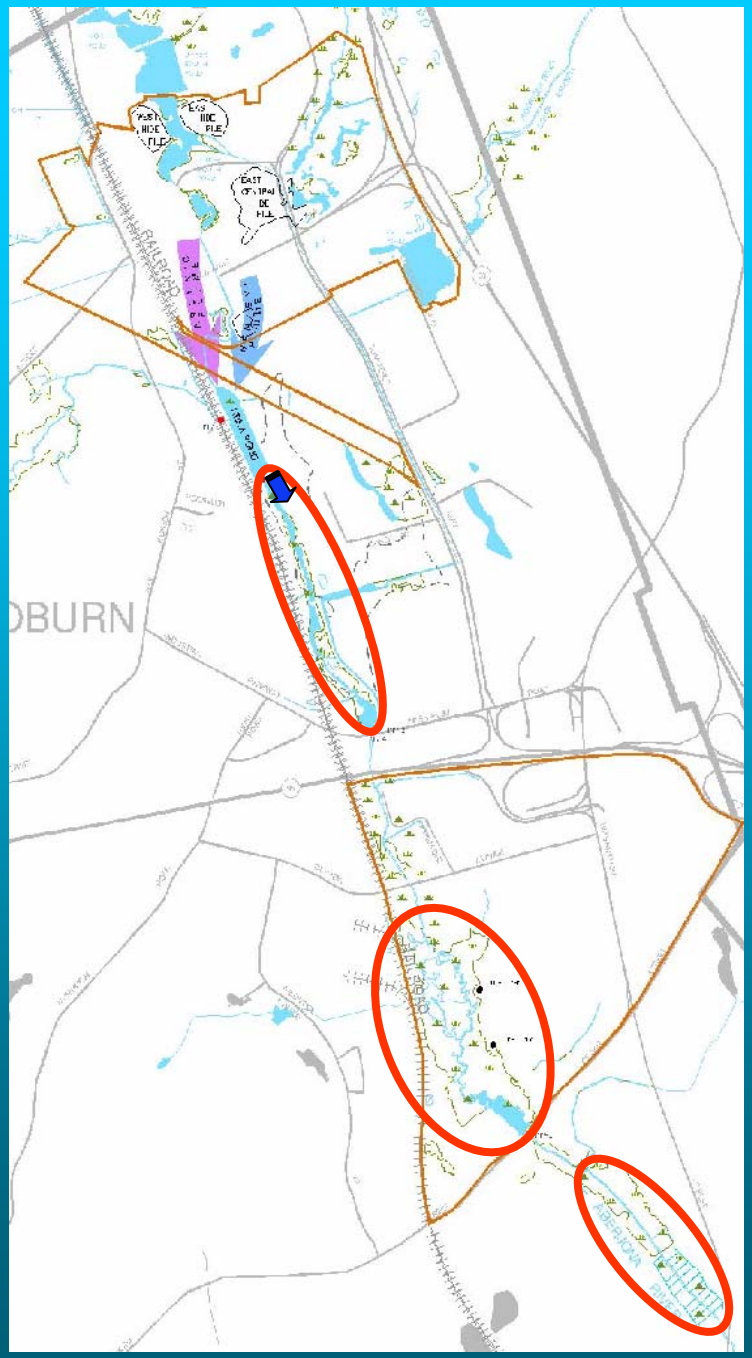
- Chemocline keeps most of the arsenic that is discharged from groundwater below the chemocline and within the sediment layer.

- Benzene is mostly biodegraded at the chemocline.

Fate and Transport of Key Contaminants

- High storm event flows break down the chemocline, stir up the bottom sediments, and "flush" contaminated sediments downstream

- Most significant depositional areas
  - HBHA Wetlands
  - Wells G&H 38-acre Wetlands
  - Cranberry Bog Conservation Area



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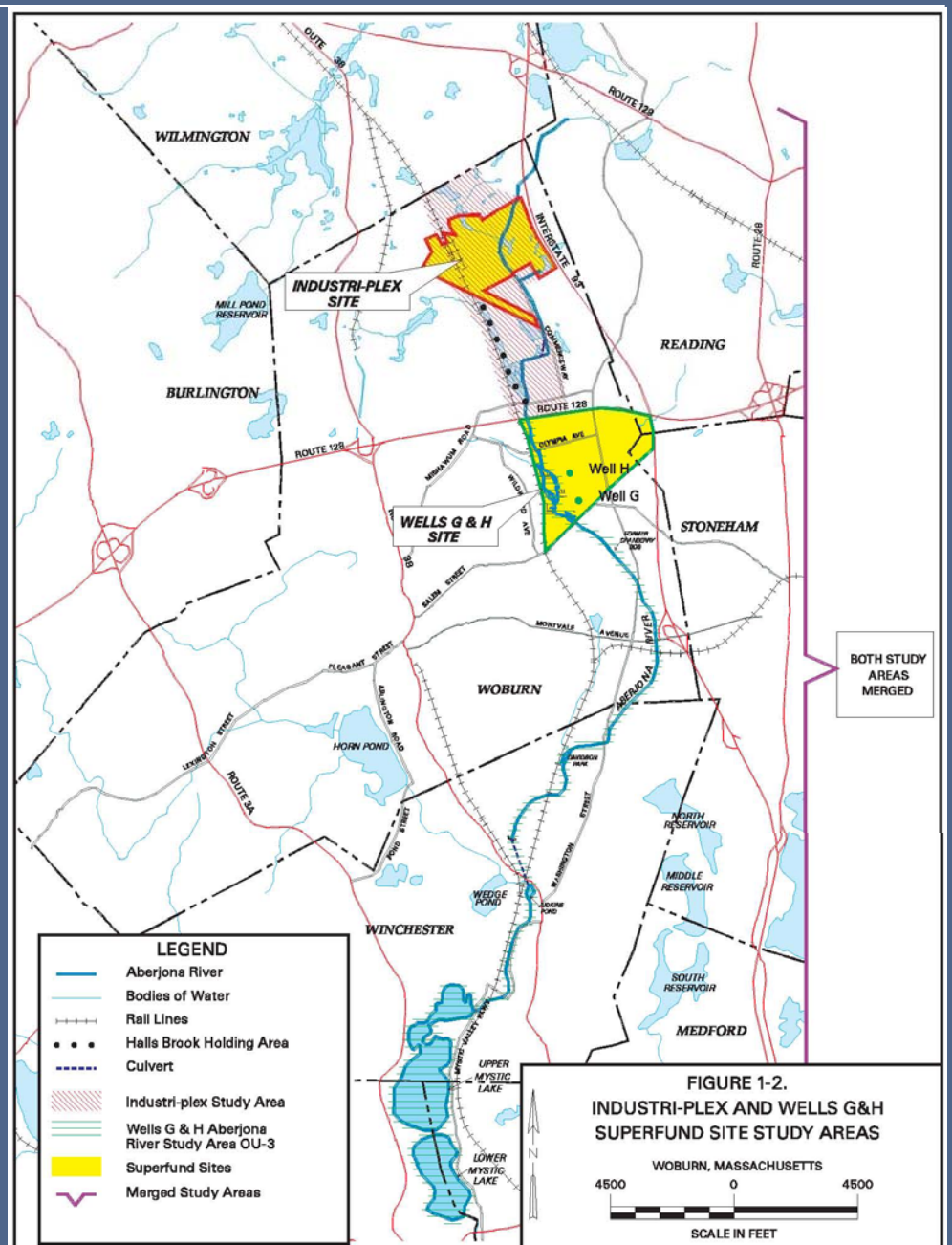
Comprehensive Baseline Ecological Risk Assessment: Summary and Conclusions

MSGRP Remedial Investigation
April 28, 2005

Industri-plex OU-2 RI Comprehensive Risk Assessment:

Northern Study Area (Industri-plex)

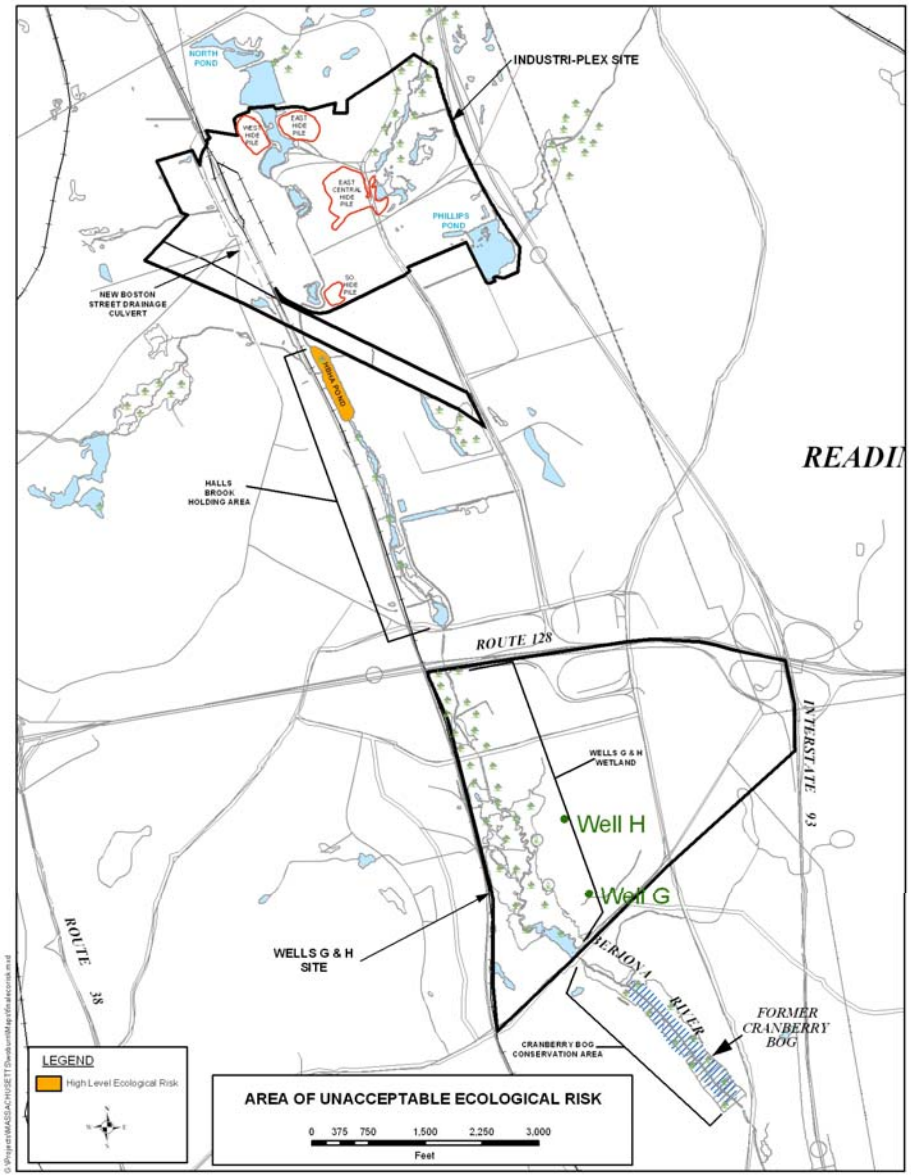
Southern Study Area (Aberjona River Study)



Ecological Risk Summary

Unacceptable risk at HBHA Pond:

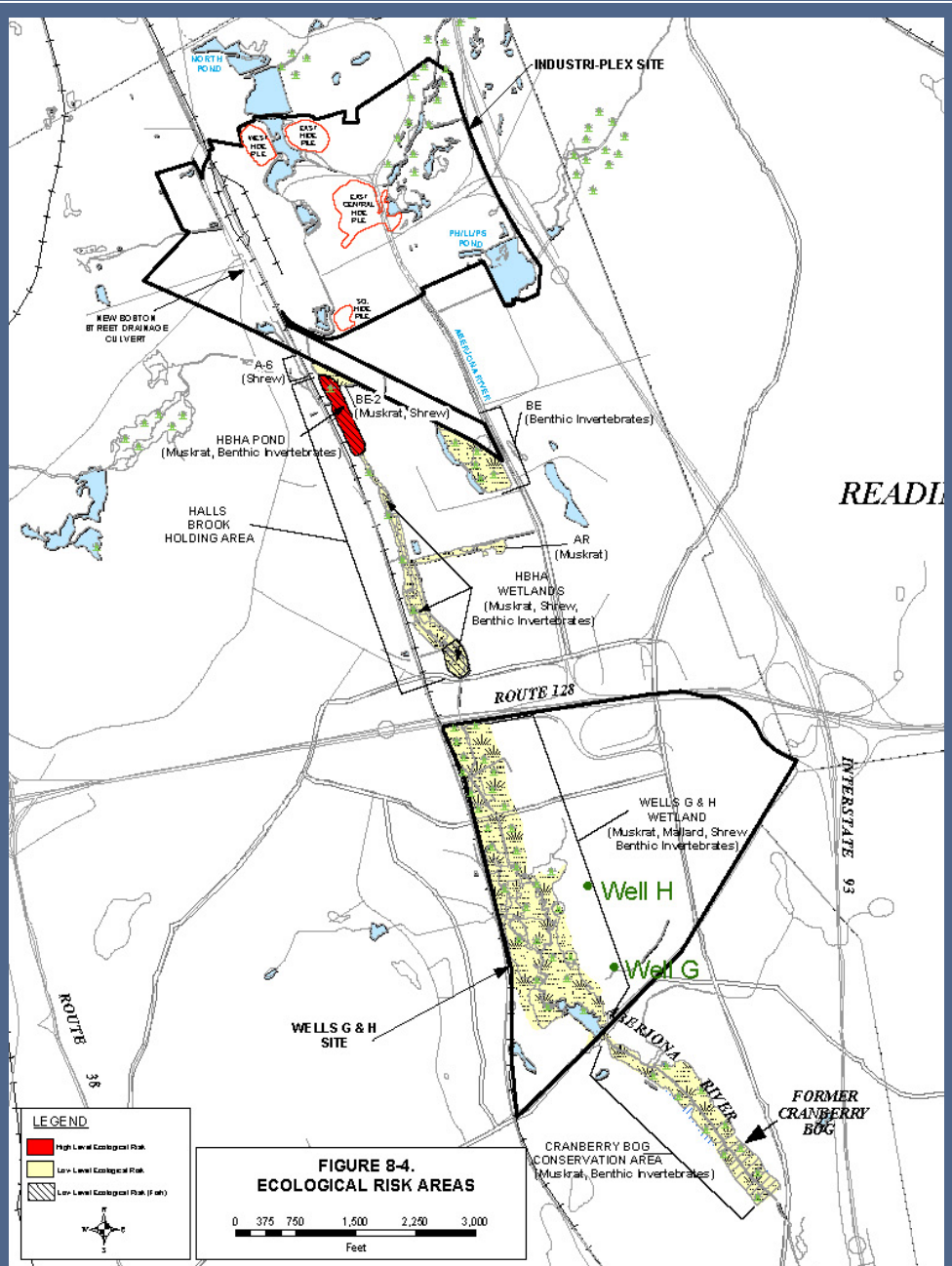
- Deep surface water
  - Aquatic life
  - Arsenic and benzene
- Sediment
  - Sediment organisms
  - Toxicity
  - Arsenic



Ecological Risk Summary

No unacceptable risk to:

- Muskrat
- Green heron
- Mallard
- Short-tailed shrew
- Warm water fish
- River otter
- Sediment organisms
  - HBHA Wetland
  - Reaches 1 & 2



Comprehensive Risk Assessment

- Similarities
  - Uniform methods and approach
  - Consistent guidance applied
  - Receptors/exposure pathways
- Differences
  - Used river otter as receptor in Northern Study Area
  - Conducted fish population study in Northern Study Area
- Evaluated the combined data set for sediment organisms
- Refinement of risk step

Refinement of Risk

- Additional evaluation for each receptor:
  - How high is the risk?
  - How much of the habitat is affected?
  - What is the level of uncertainty?
  - Would the effect have an ecologically significant adverse effect on a population?
- Based on magnitude, severity, extent, uncertainty and ecological significance of risk
  - Determination of unacceptable ecological risk

Receptors/Exposure Pathways

- Receptor species selected to represent river/wetland food chain
  - Muskrat
  - Green heron
  - Mallard
  - Short-tailed shrew
  - Sediment organisms
  - Warmwater fish
  - River otter
    - ❖Northern Study Area only

Additional Analyses

- Additional surface water data
  - HBHA Pond
  - Arsenic and benzene
- Sediment organisms
  - Association of toxicity and arsenic in sediments, when the amount of iron present is accounted for
  - Multivariate analysis of community composition data for combined study areas

Multivariate Community Analysis - Results

- Environmental variables unrelated to contaminant concentrations had the strongest influence on community structure
- Accounting for these variables, a portion of the community structure is correlated to sediment arsenic
- Results are consistent with toxicity testing
- HBHA Pond is unique
- Smaller but detectable changes down stream of HBHA Pond related to arsenic

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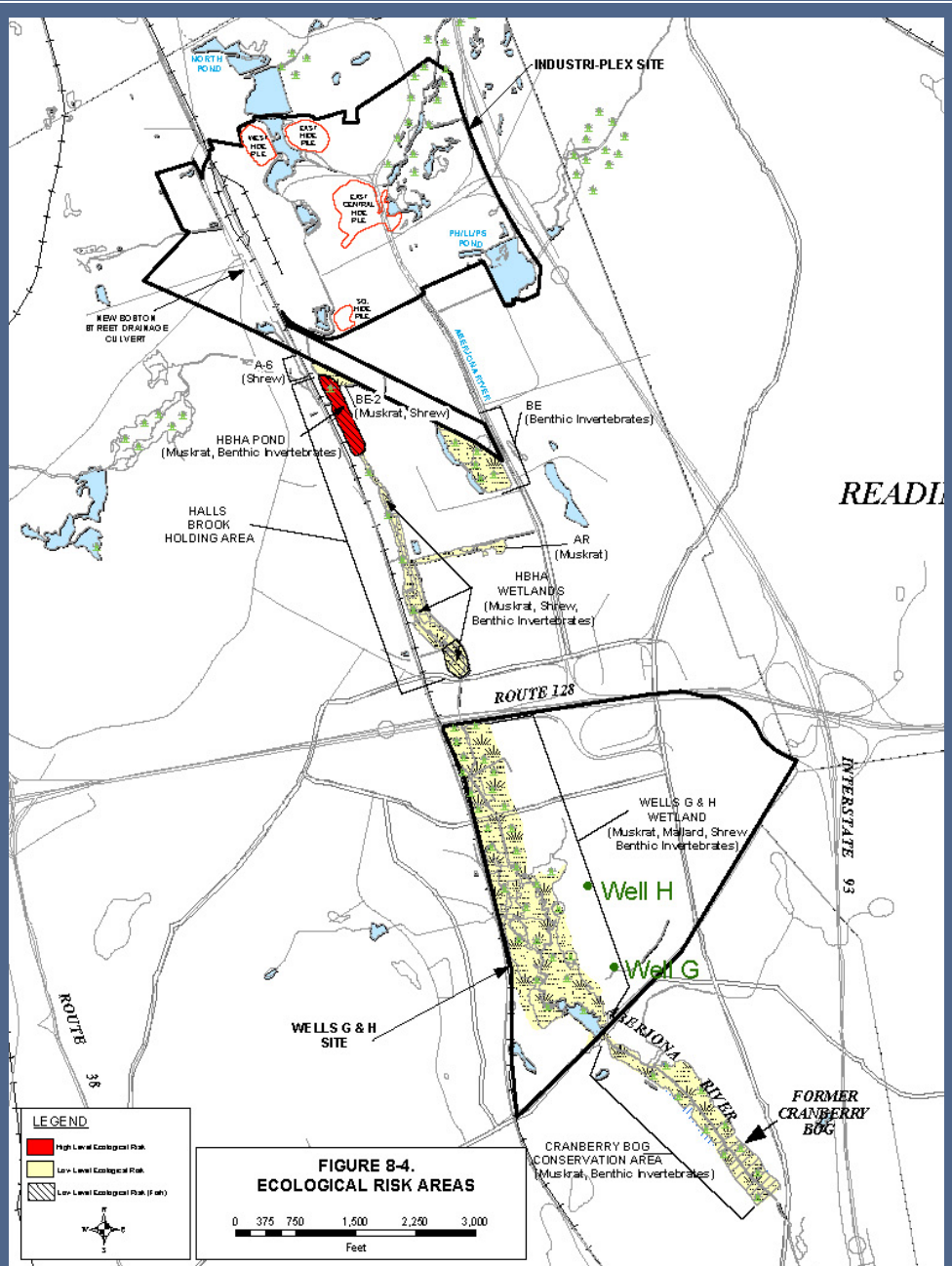

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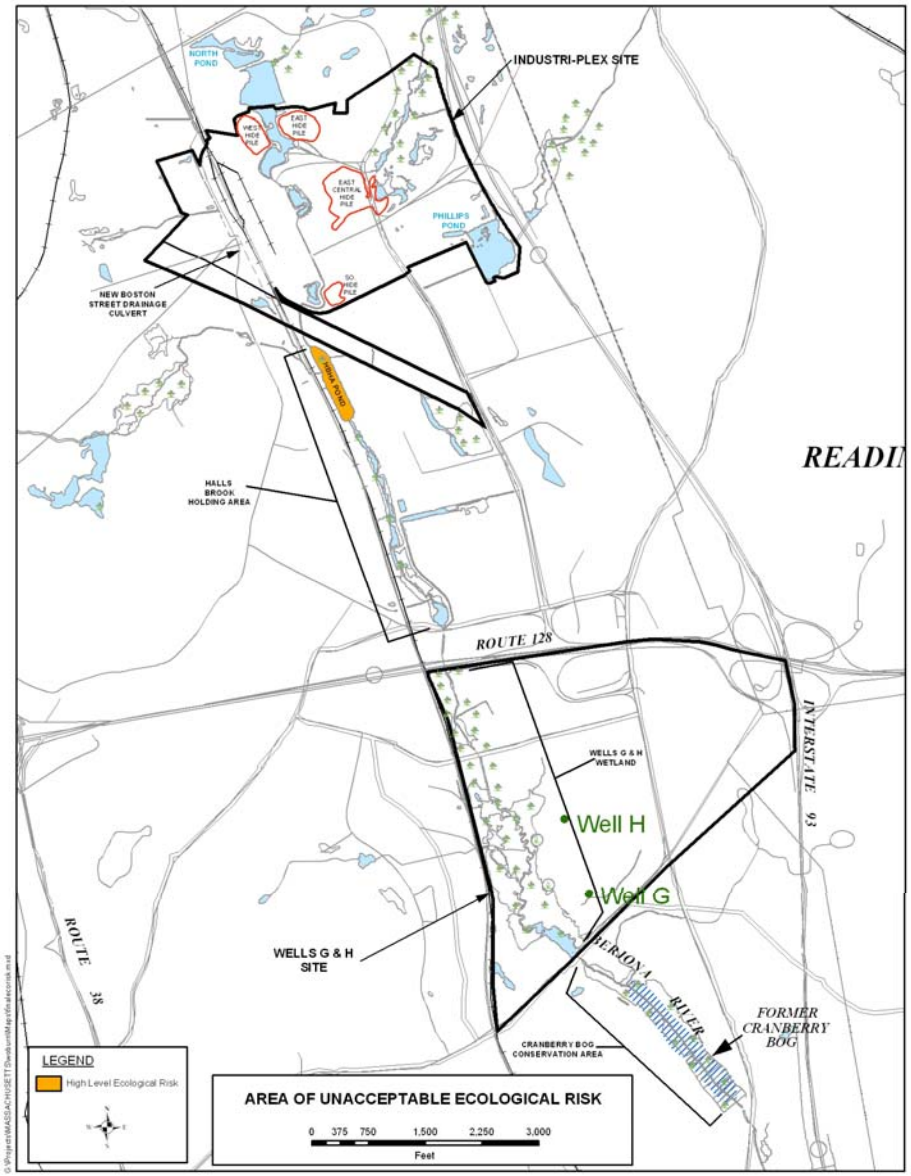

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Comprehensive Baseline Human Health Risk Assessment: Summary and Conclusions

MSGRP Remedial Investigation
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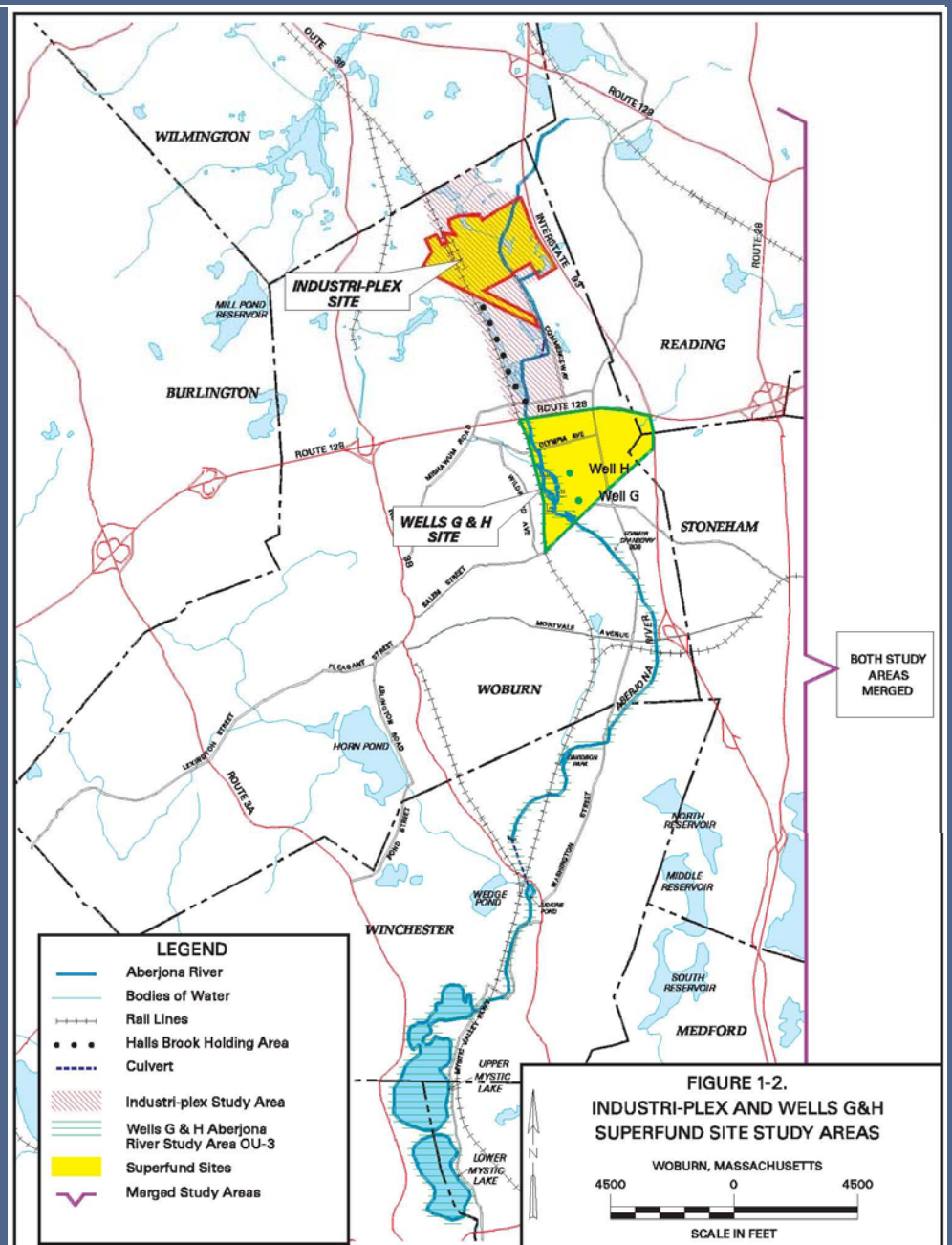
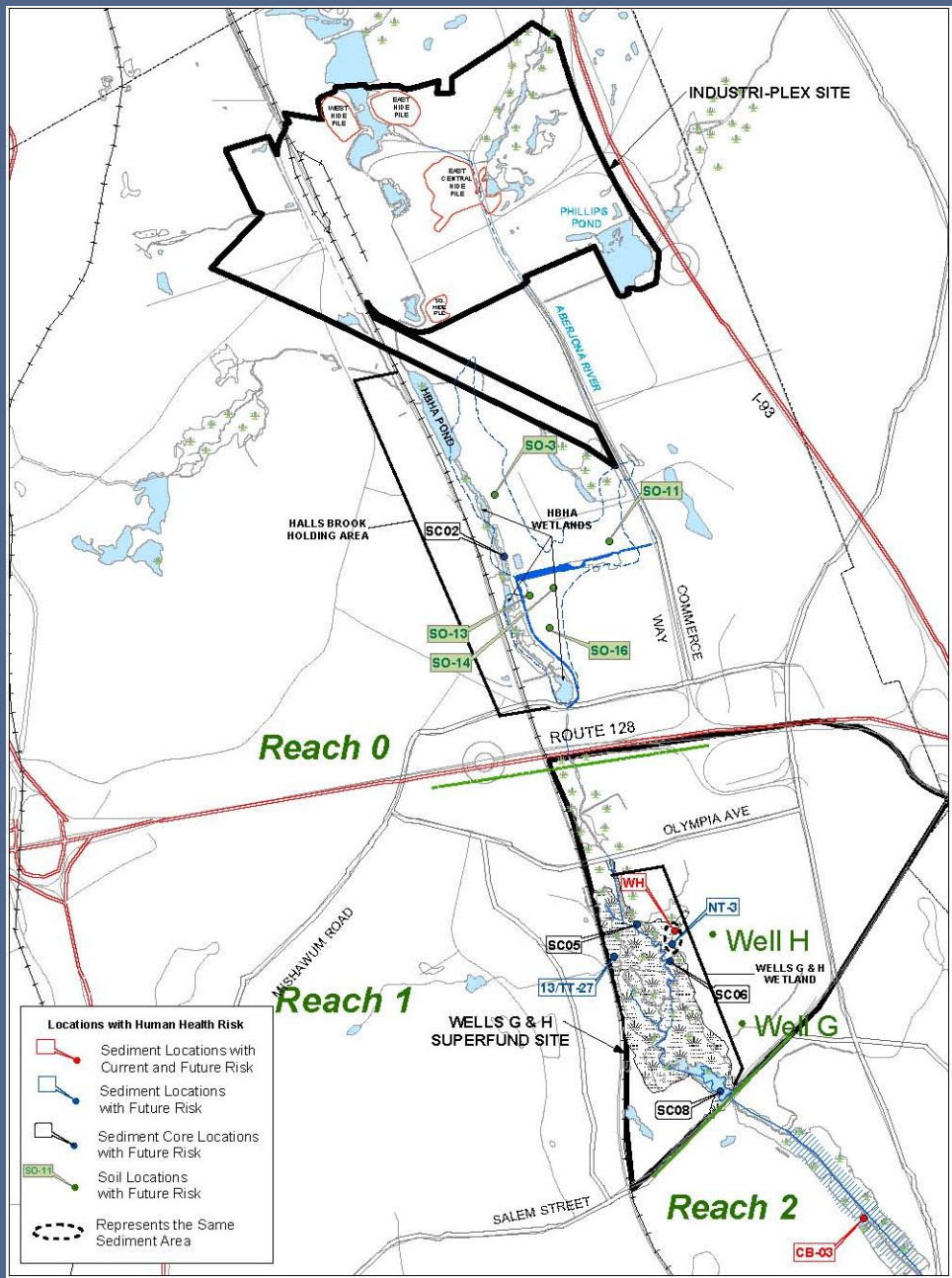


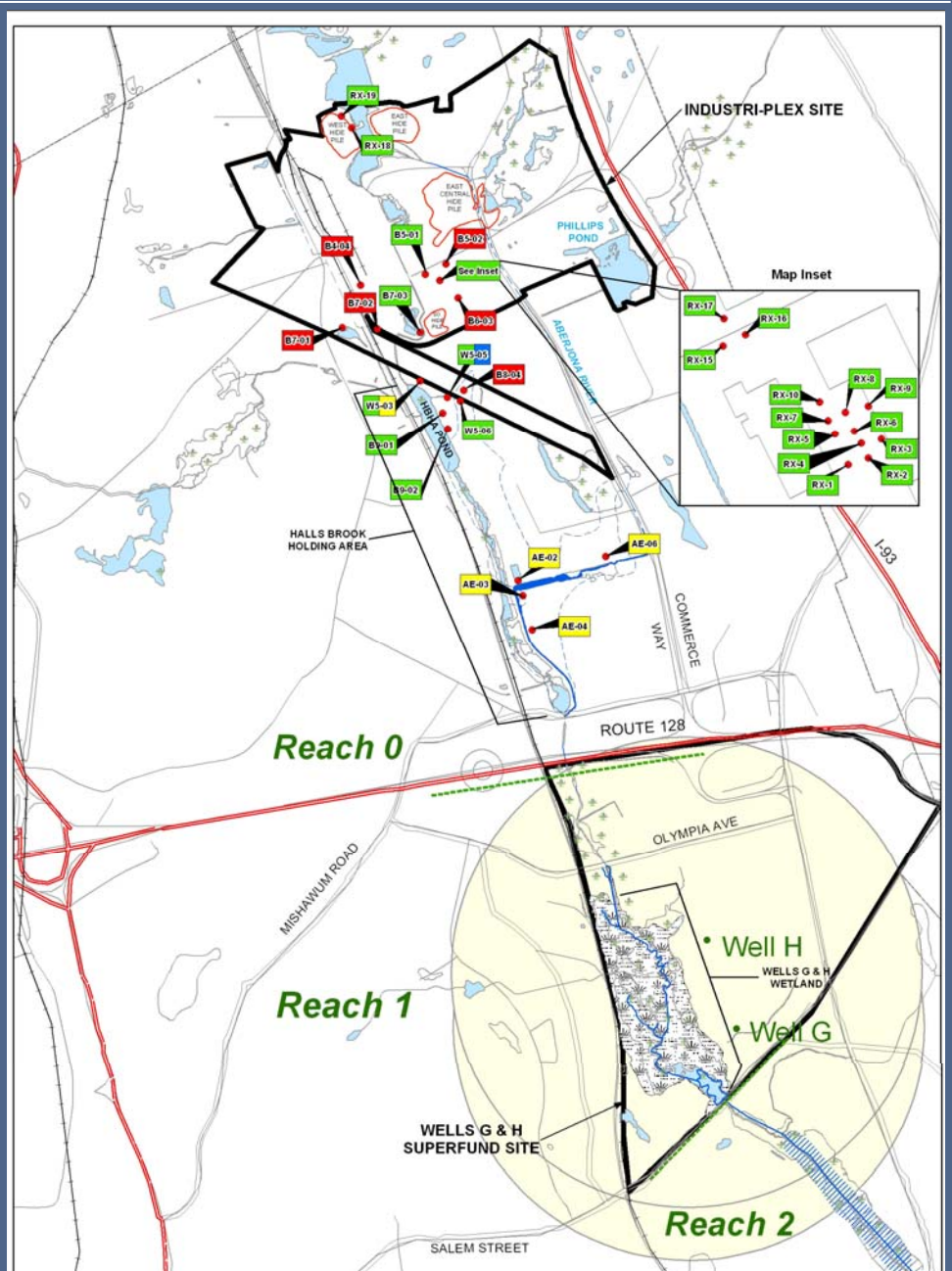
Soil and Sediment Locations with Human Health Risk:

* Soil Sampling Locations
* Accessible Sediment Stations
* Sediment Core Locations



Groundwater Risk:

Well Locations and Contaminants



Comprehensive Risk Assessment

- Similarities
  - Uniform Methods and Approach
  - Consistent Guidance Applied
  - Sediment Arsenic Bioavailability Study
- Differences
  - Media Evaluated
  - Receptors/Exposure Pathways

Exposure Assumptions

- Evaluated Reasonable Maximum Exposure (RME)
  - Upper-bound exposure frequencies (days/year)
    - Up to 104 days/year for sediment
    - Up to 150 days/year for soil
  - Thirty-year exposure duration
  - Average skin surface areas
  - Upper-bound ingestion rates

Exposure Pathways – Southern Study Area

- Recreational User (Accessible Areas)
  - Incidental Ingestion/Dermal Contact with Sediment
  - Dermal Contact with Surface Water
  - Incidental Ingestion/Dermal Contact with Soil
- Dredging Worker (Core Data)
  - Incidental Ingestion/Dermal Contact with Sediment

Exposure Pathways – Northern Study Area

• Recreational User	Incidental Ingestion/Dermal Contact with Sediment Dermal Contact with Surface Water Incidental Ingestion/Dermal Contact with Soil
▪ Dredging Worker	Incidental Ingestion/Dermal Contact with Sediment
• Groundskeeper	Incidental Ingestion/Dermal Contact with Soil
• Day Care Child	Incidental Ingestion/Dermal Contact with Soil Inhalation of VOCs from Groundwater in Indoor Air
• Commercial Worker	Inhalation of VOCs from Groundwater in Indoor Air
• Construction Worker	Incidental Ingestion/Dermal Contact with Soil Inhalation of Particulates Inhalation of VOCs from Groundwater in Outdoor Air Incidental Ingestion/Dermal Contact with Shallow Groundwater

Exposure Pathways – Northern Study Area

- Use of Groundwater as Process Water by Industrial Worker
  - Incidental Ingestion/Dermal Contact with Groundwater
  - Inhalation of VOCs from Groundwater
- Use of Groundwater by Car Wash Worker
  - Inhalation of VOCs from Groundwater

Comprehensive Risk Assessment Results

No exceedances of risk management criteria for:

- Surface Water
- Indoor and Outdoor Air

Exceedances of risk management criteria for:

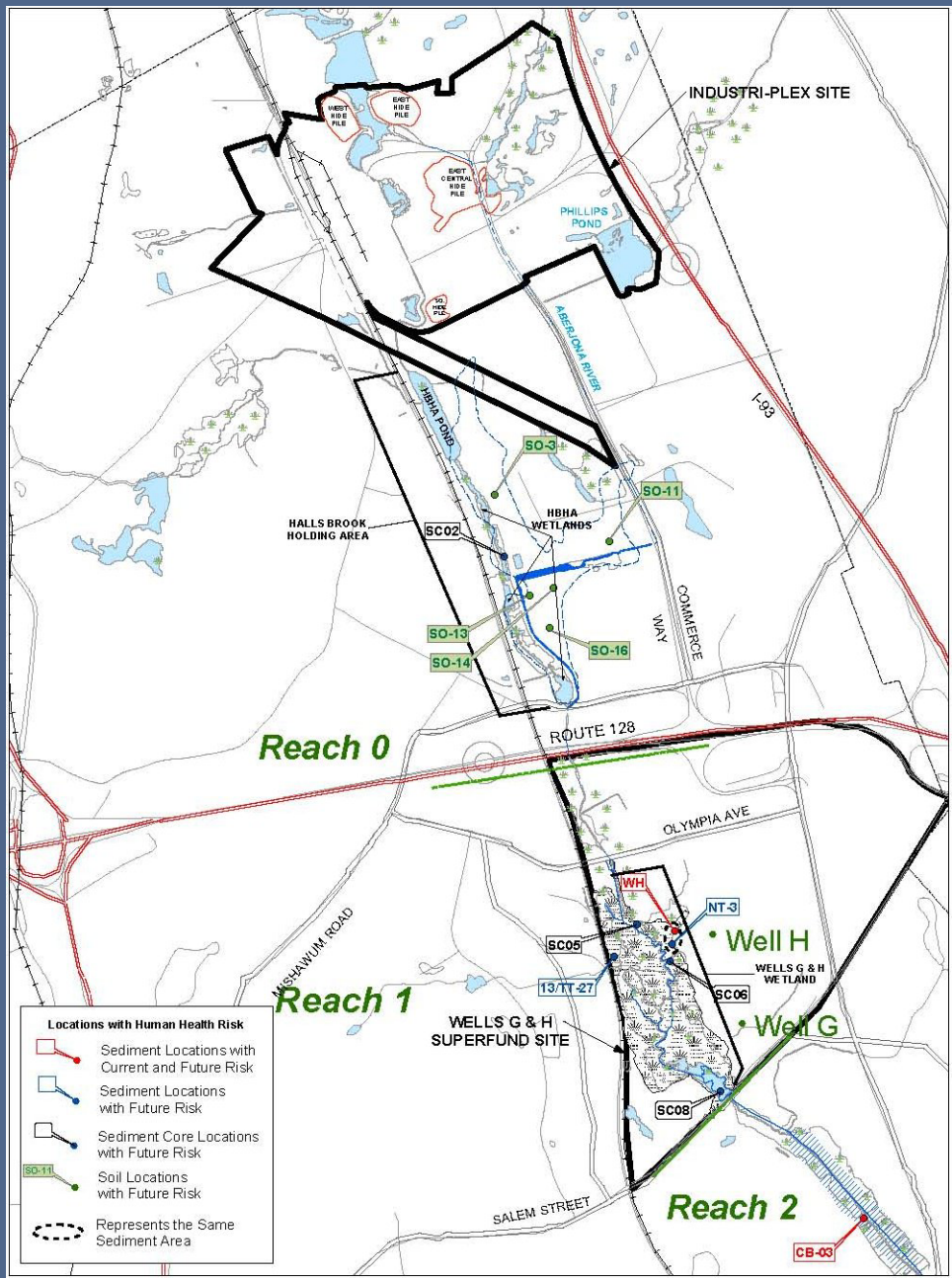
- Soil
- Accessible Sediment
- Sediment Cores
- Groundwater

Exceedances – Soil, Sediment, and Sediment Cores

- Arsenic in Soil at Former Mishawum Lake Bed
  - Future Day Care Child and Future Construction Worker
- Arsenic in Accessible Sediment in Reaches 1 and 2
  - Current Recreational User: WH and CB-03
  - Future Recreational User: WH, NT-3, 13/TT-27, and CB-03
  - City's Reuse Plan no longer includes NT-1 and NT-2
- Arsenic in Sediment Cores (Future Dredger)
  - SC02 in HBHA Wetland
  - SC05, SC06, and SC08 in Wells G&H 38-acre Wetland

Soil and Sediment Locations with Human Health Risk:

* Soil Sampling Locations
* Accessible Sediment Stations
* Sediment Core Locations

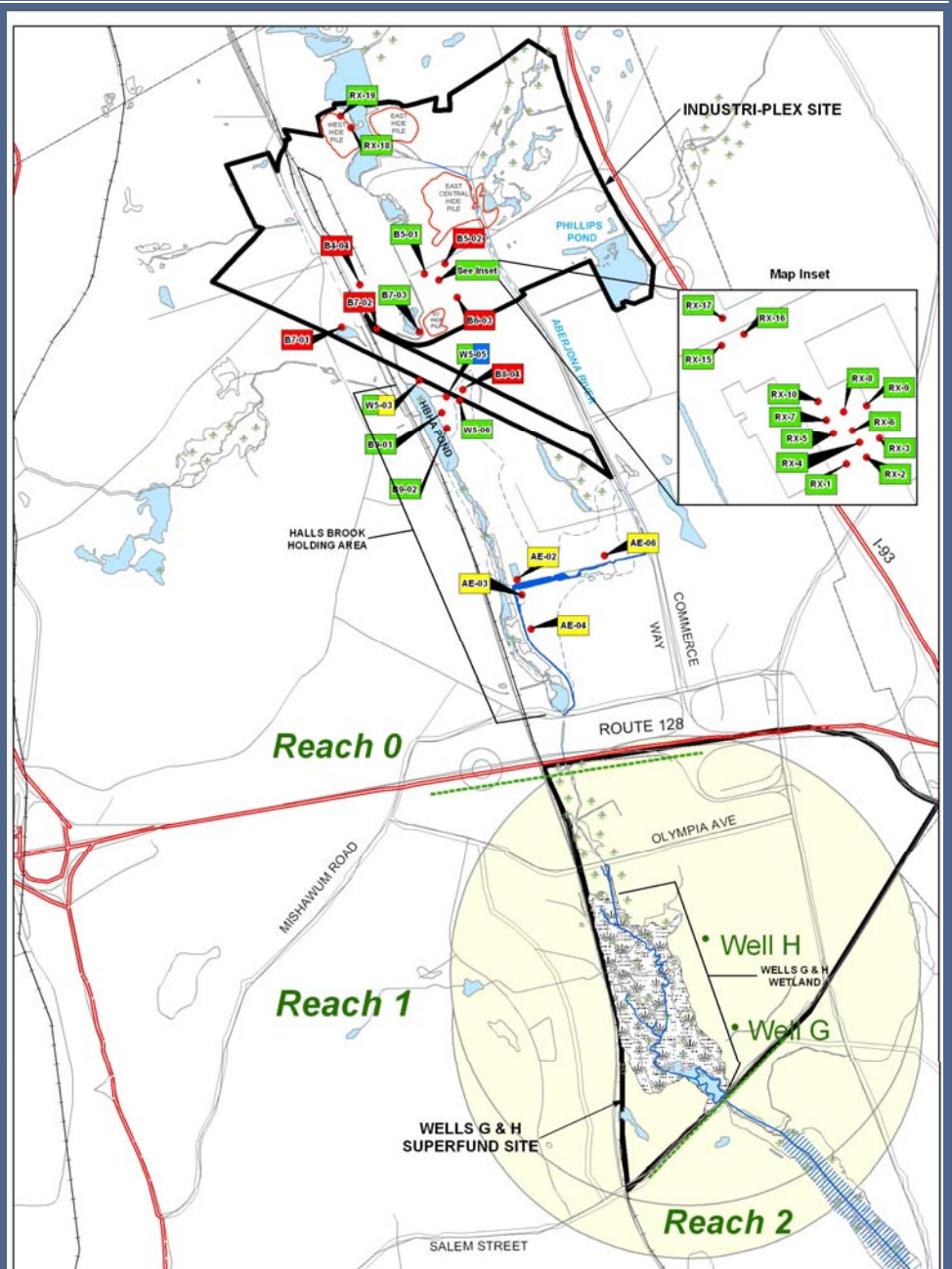


Exceedances – Groundwater

- Future Construction Worker
  - Arsenic in Shallow Groundwater
- Future Industrial Worker
  - Primarily arsenic, benzene, naphthalene, and trichloroethene
  - Minor contribution from 1,2-dichloroethane
- Future Car Wash Worker
  - Primarily benzene, naphthalene, and trichloroethene
  - Minor contribution from 1,2-dichloroethane

Groundwater Risk:

Well Locations and Contaminants



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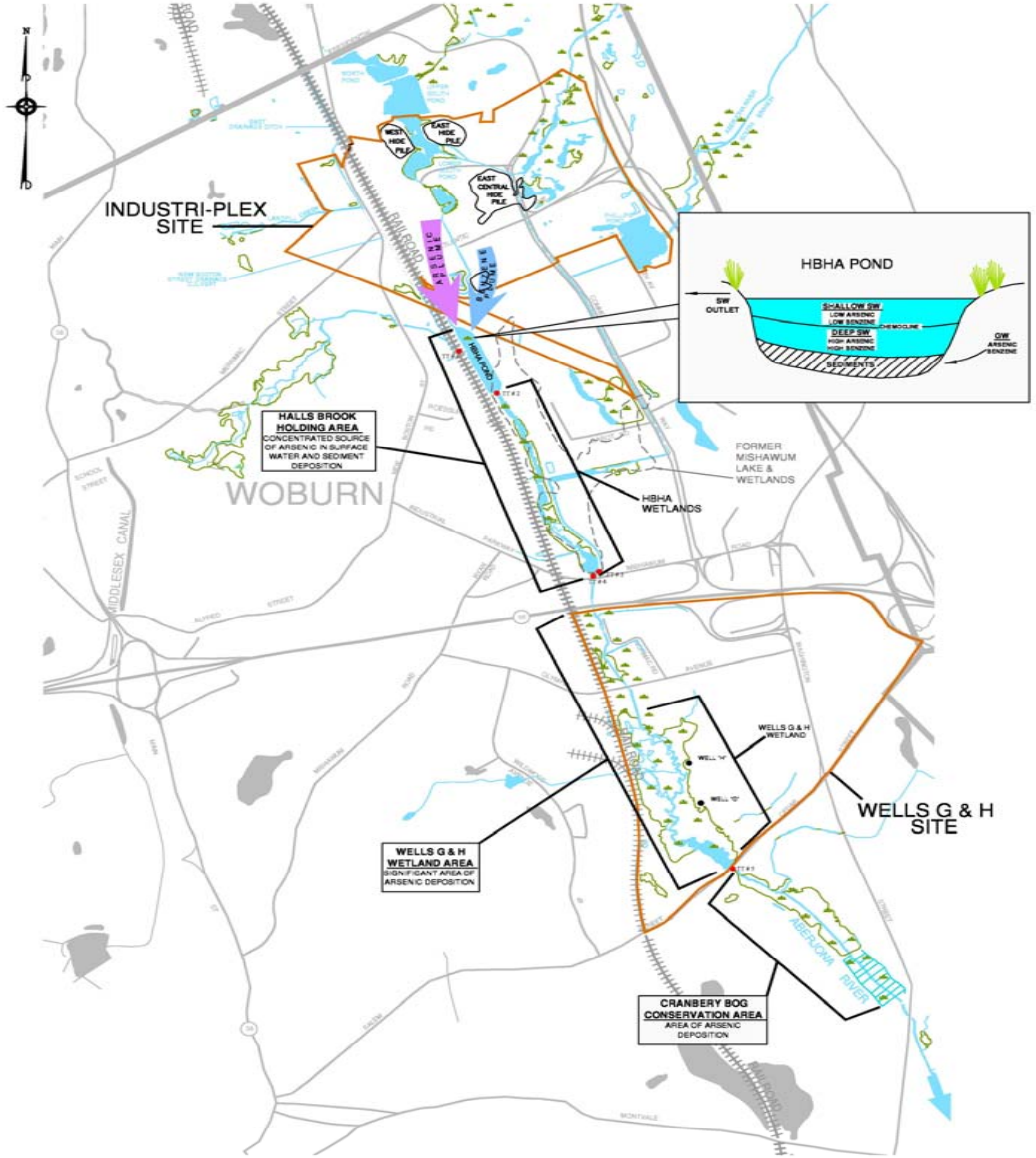
INDUSTRI-PLEX SITE
WEST HIDE PILE
EAST HIDE PILE
EAST CENTRAL HIDE PILE
ARSENIC PLUME
BENZENE PLUME
HBHA POND
SW OUTLET
SHALLOW SW
LOW ARSENIC
LOW BENZENE
CHEMOCLINE
DEEP SW
HIGH ARSENIC
HIGH BENZENE
SEDIMENTS
GW
ARSENIC
BENZENE
HALLS BROOK HOLDING AREA
CONCENTRATED SOURCE OF ARSENIC IN SURFACE WATER AND SEDIMENT DEPOSITION
WOBURN
FORMER MISHAWUM LAKE & WETLANDS
HBHA WETLANDS
MIDDLESEX CANAL
WELLS G & H WETLAND
WELL 'H'
WELL 'G'
WELLS G & H SITE
WELLS G & H WETLAND AREA
SIGNIFICANT AREA OF ARSENIC DEPOSITION
ABERJONA RIVER
CRANBERY BOG CONSERVATION AREA
AREA OF ARSENIC DEPOSITION

NEXT STEPS

- EPA to release Feasibility Study and Proposed Plan by May/ June.

- Upon release, EPA will accept comments on the RI Report, the Feasibility Study and the Proposed Plan during 30-day comment period.